Economic and Social Analysis in Fisheries Management

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The fish off the coasts of the United States, the highly migratory species of the high seas, the species which dwell on or in the Continental Shelf appertaining to the United States, and the anadromous species which spawn in United States rivers or estuaries, constitute valuable and renewable natural resources. **These fishery resources contribute to the food supply, economy, and health of the Nation and provide recreational opportunities.**

-[MSA, Sec 2(a)]

–National Standard 1–

"Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery **for the United States fishing industry."**

–National Standard 4–

"If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that **no particular individual, corporation, or other entity acquires an excessive share of such privileges."**

–National Standard 5–

"Conservation and management measures shall, where practicable, **consider efficiency in the utilization of fishery resources***; except that no such measure shall have economic allocation as its sole purpose."*

–National Standard 7–
"Conservation and management measures shall, where practicable, **minimize costs and avoid unnecessary duplication."**

–National Standard 8–
"Conservation and management measures shall...take into account the importance of fishery resources to fishing communities by **utilizing economic and social data...in order to (A) provide for the sustained participation** *of such communities, and (B) to the extent practicable,* **minimize adverse economic impacts** *on such communities."*

REQUIRED PROVISIONS.

"Any fishery management plan ... shall ... **include a fishery impact statement** *... which shall* **assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts**, *of the conservation and management measures on, and possible mitigation measures for...*

(A) **participants in the fisheries and fishing communities** *affected by the plan or amendment;*

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and

(C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery."

-[MSA, Sec 303 (a) (9)]

Fishery Impact Statement requirements are incorporated into NEPA documents, providing a central analytical framework.

Historical Trends Included in Affected Environment

- participation and count data, net or gross revenues, catch, etc
- disaggregated by state and/or port, gear type, vessel size, etc

Predicted Outcomes in Environmental Consequences/Impacts

- use same/similar categories as in Affected Environment to provide sufficient context
- must address:
  - overall impacts of alternatives/options
  - differential impacts on sub-populations

Framework For Considering Social and Economic Analyses

Regulatory options:

- Market-based
  - annual fish right auctions
  - tradeable quotas (catch shares)
    - ITQs
    - effort allocations
  - tradeable fish tags/trap limits
- Performance standards
  - TACs, ACLs, etc
  - bycatch limits and/or precision standards (CVs) for bycatch estimates
- Technology standards
  - mesh/fish size limits
  - bag limits
  - horsepower/vsl size restrictions
  - gear restrictions/requirements

Types of analyses:

- Benefit/cost
- Cost efficiency
- Direct impact
- Input/output
- Social Impact Analysis

Units of analysis:

- Producers
- Consumers

Regulatory drivers:

- MSA
- EO 12866/13771
- RFA
- EO 12898 (EnvJustice)

Efficiency scale

Market-based > Performance > Technology

Points of entry

Analysis to support alternative development

Impacts of developed alternatives

Example 1: Direct Impacts Analysis

ACL reductions in a multispecies fishery (New England groundfish)

Aggregate impacts:

Results

- Four stocks likely to be constraining:
  - GOM cod
  - GB cod (west)
  - SNE/MA yellowtail flounder
  - Witch flounder
- Gross revenues predicted to decline by 7% for FY16 relative to FY15
- Variable costs predicted $5m lower in FY15/16 relative to FY13/14 (fuel prices down)
- Gains from lower variable costs offset by losses to ASM costs (estimated $3m)
- Predicted increases in redfish landings area of major uncertainty, likely to over-estimate revenues, perhaps by $1-2m
- Aggregate stability masks potential for serious distributional impacts

Disaggregated impacts:

Predicted gains:

- Boston (+33% to $17.2m)
- Gloucester (+35% to $11.1m)
- New Hampshire (+23% to $1.6m)

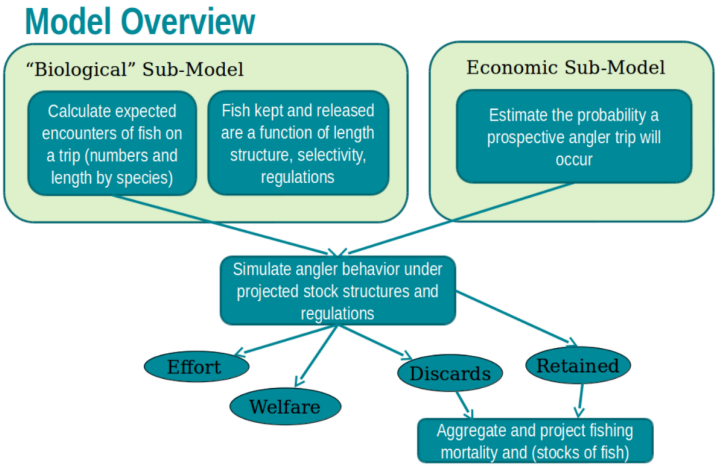
Predicted losses:

- New Bedford (-46% to $9.2m)
- Point Judith (-58% to $0.8m)
- New York and New Jersey (-84% to $0.3m)

	No Action	WITH ASM	NO ASM
Connecticut	n/a	n/a	n/a
Massachusetts	-92%	-3%	-3%
Boston	-90%	33%	33%
Gloucester	-91%	35%	32%
New Bedford	-94%	-46%	-45%
Maine	-94%	-9%	-11%
Portland	-94%	-8%	-10%
New Hampshire	-85%	23%	15%
New Jersey	-100%	-100%	-100%
New York	-100%	-70%	-80%
Rhode Island	-96%	-65%	-62%
Point Judith	-95%	-58%	-58%
Other Northeast	n/a	n/a	n/a

Example 2: Prospective Analysis to Support Alternative Development

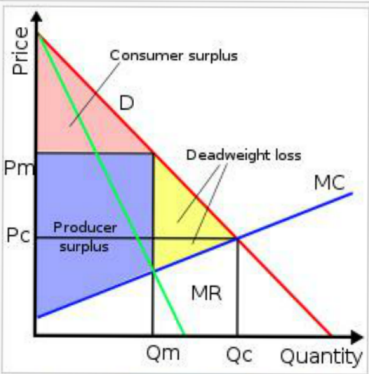
Setting recreational size and bag limits



Example 3: Prospective Analysis to Support Alternative Development

Establishing excessive share limits

The Economics of Market Power



Surpluses and deadweight loss created by monopoly price setting

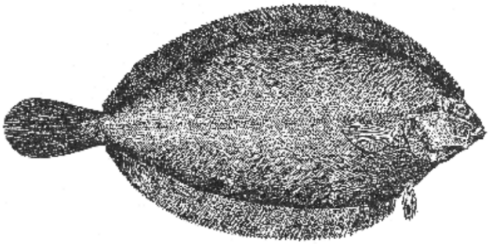
- Monopolist restricts supply to maximize producer benefits
- This can reduce welfare by shrinking total benefits from market
- Would only want to do this when benefits > costs:
  - *when a 1% reduction in supply leads to a greater-than-1% increase in price, there may be an incentive to withhold.*
- We have math to figure this out.

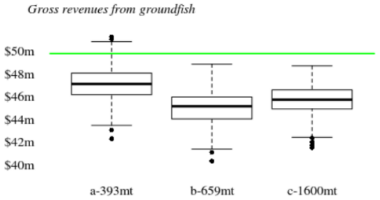
Example 4: Direct Impact Analysis

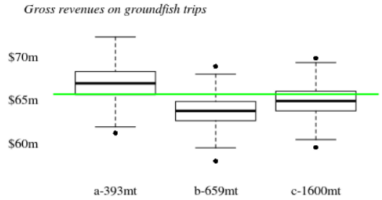
Informing Allowable Biological Catch through "risk policy"

Three potential ABCs modeled:

- 393mt
- 659mt
- 1600mt







Example 5: Impacts of One-off Policy Change

Shifting from subsidized observer coverage to industry-based funding

Subsidy removal: Using cost survey data to estimate owner-level profitability

Table 8 - Estimated returns to owner and ASM costs (values reported in constant 2014 $1,000, *2014 data are preliminary, **2015 data are predictions)

	2010	2011	2012	2013	2014*	2015**
Total revenues	114,759	124,942	96,942	80,813	79,348	72,081
Variable costs	30,840	39,868	35,761	30,718	24,108	23,700
Crew share	34,362	37,528	29,332	24,542	23,969	22,091
RMUI	8,736	8,245	8,069	7,290	7,112	6,178
Business/Haul-out	15,083	14,128	13,596	12,089	11,528	10,061
Sector fees	1,772	1,842	1,396	1,263	1,152	1,311
Return-to-owner	23,966	23,332	8,787	4,911	11,479	8,740
ASM	5,190	39,868	3,081	1,990	2,729	2,637
ASM as pct RTO	*22%*	*26%*	*35%*	*41%*	*24%*	*30%*
Number active vessels	440	384	379	319	298	221

Table 9 – Estimated counts of vessels with positive and zero or negative returns to owner (ASM costs not included) by year (*2014 data are preliminary, **2015 data are predictions)

	2010	2011	2012	2013	2014	2015
# vessels RTO <=0	133	114	157	156	111	86
# vessels RTO >0	307	270	222	163	187	135
proportion fleet <=0	*30%*	*30%*	*41%*	*49%*	*37%*	*39%*
Total number of vessels	440	384	379	319	298	221

Table 10 – Estimated counts of vessels with positive and zero or negative returns to owner by year, including hypothetical ASM costs (*2014 data are preliminary, **2015 data are predictions)

	2010	2011	2012	2013	2014	2015
# vessels RTO <=0	159	136	173	164	120	130
# vessels RTO >0	281	248	206	155	178	91
proportion fleet <=0	*36%*	*35%*	*46%*	*51%*	*40%*	*59%*
Total number of vessels	440	384	379	319	298	221

Social Impact Assessment

"...a scientific method of gauging the social and cultural consequences of alternative fishery management actions or policies"

- Performed as part of NEPA analysis, identical in structure to economic impacts analysis, and often co-integrated
- Nationwide efforts:
  - Defining NS8 fishing communities
  - Standardizing social indicators:
    - Social Vulnerability
    - Commercial and Recreational Fisheries Engagement and Reliance
    - Gentrification Pressure Vulnerability

Non-NEPA Regulatory Requirements

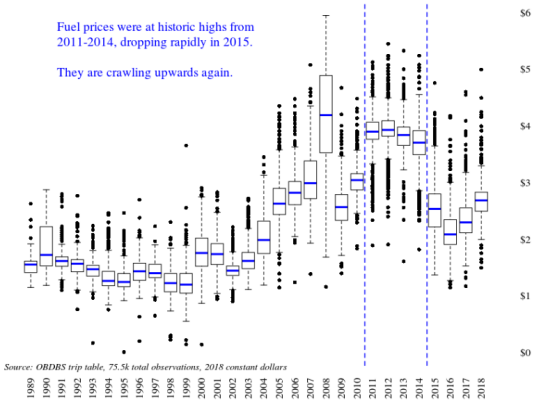
- **Regulatory Impact Review (EO 12866 / EO 13771)**
  - Benefit/Cost analysis
  - All affected sectors/fishing businesses
  - Longer time horizon (real dollars, discount rate)
  - Economically significant rule
    - greater than $100 million annual effect, or
    - Significant economic impact on particular region or sector
- **Regulatory Flexibility Act (RFA)**
  - Short term change in financial status
  - "Directly regulated entities" (owners/businesses/vessels)
  - *Will rule have a significant economic impact on a substantial number of small entities?*
    - *size standard (2016 = $11 mil for commercial fishing businesses)*

Best Practices

- Baseline data at same scale as impacts/predictions (NEPA: AE=EC)
- Data, theory, model and results clearly explained
  - Assumptions clearly specified
- Time-series data expressed in real dollars (say, >3 years)
  - *nominal* vs *real*
  - inflation can distort perceptions:
    - $100 today was:
      - $96 in 2015
      - $88 in 2010
      - $80 in 2005
      - $70 in 2000

Best Practices, (continued)

- Include costs whenever possible
  - Revenue changes can mask cost increases/decreases
  - Options may have different costs
    - *shifts in effort location*
    - *additional administrative or regulatory compliance costs*
    - *etc...*
  - Fuel prices, for example, can play a large role *(a 500 VHP dragger saved, on average, $450/day in 2015, relative to 2011-2014)*



Common Questions

- Recreational vs. commercial valuation
- Valuing goods that don't trade in markets
  - *Willingness-to-pay* v. *Willingness-to-accept*
  - *Stated preference* v. *Revealed preference*
- Peer review and the role of the SSC

Lying with numbers, part (1)

Costs and benefits with non-uniform time trends - **THE DISCOUNT RATE**

- The rate at which society may be willing to trade off between consumption today and consumption tomorrow
- Used whenever costs and benefits are estimated across time (e.g. Net Present Value calculations)
- *"The higher the discount rate, the lower is the present value of future cash flows"*
- NOAA has historically recommended two rates:
  (1) NOAA-defined "social rate of time preference" = 3%
  (2) OMB-defined "base-case discount rate" = 7%

In cases where an industry is trading off consumption in a transactional sense, **discount rates in accordance with alternative investments (e.g. higher)** *are appropriate*

In cases where the trade-off is considered on behalf of society in a non-transactional sense **discount rates in accordance with the social rate of time preference (e.g. lower)** *are appropriate*

Lying with numbers, part (2)

"Multipliers" and Input-Output analysis

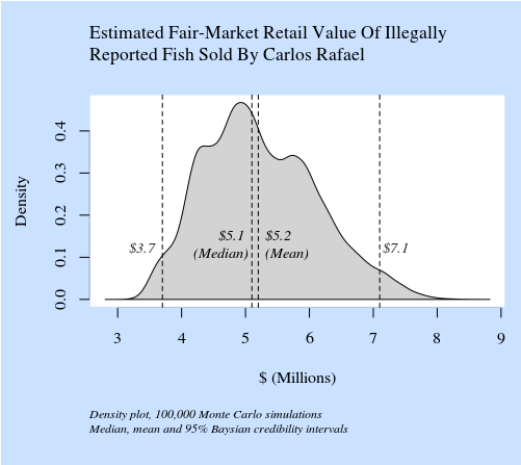
- These analyses apply mark-ups and second-order effects (jobs supported, etc) as products travel from initial to final point of sale
- *"Generally, analyses should treat resources as if they were likely to be fully employed. Employment or output multipliers that purport to measure the secondary effects of government expenditures on employment and output* **should not be included** *in measured social benefits or costs"* (OMB Circular A94)
- Unusual case: Carlos Rafael and the Lacey Act

Lying - Carlos Rafael

Carlos Rafael mis-reported 783k pounds of fish that he sold for $1.6 million

Federal sentencing guidelines under the Lacey Act tie the sentence to the "fair-market retail value" of the product

Traced the fish across secondary and tertiary dealers and through to restaurants in NYC



Fisherman and former NEFMC member David Goethel. Credit: Boston Globe

New England Groundfishing Industry Hit...
By: Christian Science Monitor
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Credit: NOAA

Questions?